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THE CAMBRIDGE NATURAL HISTORY.

The Cambridge Natural History. "Insects. Part II." By David Sharp. Pp. xii + 626. (London: Macmillan and Co., Ltd., 1899.)

THE appearance of the concluding part of Dr. Sharp's treatise on Insects, after an interval of nearly four years since that of its predecessor, is most welcome to all readers who were led by the first part of this work to recognise what a step in advance had been taken in the treatment of the subject.

The present volume has confirmed the opinions we then expressed in these columns on Part i., and again we must record our admiration for the knowledge and industry of the author, and for the attractive manner in which he has set forth his results; for wherever the subject-matter allows, the whole work is most fascinating reading.

As was pointed out in 1896, the chief feature of this work is the extensive use made of modern researches, of a kind not hitherto found in text-books. So far as insect morphology is concerned, one or two other recent works may challenge comparison with the present one, but we know of none that attempts to bring forward so large a bulk of unfamiliar particulars, which in a "natural history" are appropriately of the first importance, about the habits and life-histories of insects. But such topics take space, and a complete history of insects on this large scale can only be condensed, even into the 1100 or more pages of this treatise, either by general compression or by the selection of topics for detailed treatment, to the exclusion, so far as practicable, of others. Dr. Sharp has preferred the latter plan, and has been remarkably concise in dealing with such parts of his subject as are familiar from other accessible text-books, which this work may be said rather to supplement than to supersede.

The treatment of certain portions, particularly of Coleoptera and Lepidoptera, will perhaps come as a disappointment to those students who do not bear in mind the limitations of space that have hampered the author. Preconceived notions of the relative importance of insect-families are not easily got rid of, and it is something of a shock to find, *e.g.*, the Cerambycidæ dismissed with less than four, or the Tineidæ with three pages. It would have been an advantage if the editors could have seen their way to devote still more space to the subject, perhaps by restricting Vol. v. to the insects alone. The association with the Prototracheata and Myriapods, if zoologically orthodox, is not of much practical value.

We think, too, that the omission of certain obscure families, except for a bare mention of their existence, would have been a gain. However much symmetry may require a notice of each of the many families of insects (Dr. Sharp enumerates eighty-five in the Coleoptera alone), such notice is not worth giving unless it can be adequately done, and the accounts, for example, of the Rutelinæ, Ægialitidæ, or Apioceridæ, to select at random, serve no clearly useful purpose.

The present volume deals with the Tubuliferous and Aculeate Hymenoptera, the Coleoptera, Lepidoptera, Diptera, Thysanoptera and Hemiptera. The Aphaniptera are treated as a sub-order of Diptera, and the Strepsiptera and Anoplura are included provisionally with Coleoptera and Hemiptera respectively.

Of these orders, the Hymenoptera, which lend themselves admirably to treatment from a bionomical standpoint, are dealt with in great fulness, the observations of M. Fabre on habits being in particular constantly referred to at length. No less than fifty-three pages are devoted to the ants alone, and, among much that is interesting, attention may be called to the accounts of the Dorylides, of the associations of ants with other insects (chiefly based on Father Wasmann's work, and again dealt with under Coleoptera), and to Mr. Green's drawing, on p. 147, of a worker of *Oecophylla smaragdina* using a larva of the species as a kind of animated gum-bottle for joining together the edges of leaves.

In proportion to their numbers, Coleoptera are the least interesting of insects. Their life-histories are very little known, and with the exception of the singular parasitism and hypermetamorphosis found in the Cantharidæ and their allies, are singularly devoid of noticeable peculiarities. It is not surprising, therefore, that even Dr. Sharp's intimate knowledge of the Order has not prevented him from being "gravelled for lack of matter,' and that this chapter, overweighted as it is with many families, is among the least readable in the work. With the removal of Gyrinidæ from the Hydradephaga, few entomologists will be disposed to disagree; but the grouping of the Clavicorn and Serricorn series of Coleoptera into a single aggregate, to be called Polymorpha, is of questionable value. The new series is admittedly incapable of definition, except by the fact that its components do not belong elsewhere; and to associate into a single congeries of forms such widely different families as, for example, the Staphylinidæ and Buprestidæ, is to abandon classification, so far as a fourth of the Order is concerned.

Dr. Sharp pays a good deal of attention to stridulating organs throughout his work, and describes and figures (we imagine, for the first time) a remarkable modification of the hind legs of Passalid larvæ into paws which scratch a stridulating plate on the middle coxæ. It is hard to imagine why a larva that lives in rotten wood should desire to stridulate, but the practice appears to be common among the Lamellicorns. He does not refer to, and perhaps is not acquainted with, the remarkable asymmetrical structure, probably a sound-producing organ, which Ribaga has described in the abdomen of the bed-bug.

Great advances have been made in recent years in the study of Lepidoptera, chiefly with a view to obtaining sound classificatory points; and the chapter on these insects is noteworthy for the completeness with which it deals with lepidopterous structure and development, especially of the mouth parts (in connection with which attention may be called to the figure illustrating the pupal mandibles of *Micropteryx*, first described by Dr. Chapman in 1883) and of the wings, wing-scales, and coloration. An interesting sense organ of unknown function in the abdomen of *Chrysiridia* is here described for the first time. More might have been said with advantage on Dr. Chapman's researches on lepidopterous

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pupæ, for, though several times alluded to in the text, no description of them is given. Although incomplete, they have given a great impetus to the study of lepidopterous relationships, and it is not every reader that has time or opportunity for turning them up in the *Transactions* where they appeared.

The system followed in the Heterocera is that given in Sir George Hampson's "Fauna of British India—Moths," but it has the manifest disadvantage that it does not include two or three of the families referred to. On p. 432 the Prodoxidæ are called a family, though they are clearly intended to be included in the family Tineidæ. The use of the same term and ending for an aggregate and its subdivision tends to confusion.

Mention of the Lepidoptera leads naturally to the subject of mimicry. So far as facts are concerned, Dr. Sharp brings forward many interesting examples, among them an unrecorded case of the larva of a British bug, *Nabis lativentris*, which mimics an ant, the resemblance being absent in the imago. On the other hand, no reference is made to some of the astounding and comparatively little known resemblances found among Membracidæ. In a species allied to one, *Heteronotus trinodosus*, which is figured, the prothoracic prolongation takes on the form of the entire body of a Hymenopterous insect, so that the Membracid walks about under a mask, or rather, a false body, of the most deceptive kind.

Dr. Sharp is, however, averse from countenancing any theory of the subject, and his brief account of existing hypotheses is scarcely impartial. In a singular criticism he writes:

> "In endeavouring to realise the steps of the process of the development of the resemblance we meet with the difficulty that the amount of resemblance to the model that is assumed to be efficient at one step of the development, and to bring safety, is at the next step supposed to be inefficient and to involve destruction."

This appears either to involve a non-comprehension or to imply a complete negation of the principles of natural selection; we do not know whether the latter is intended.

Of the remaining chapters, that on Diptera is of especial value, on account, not so much of their intrinsic interest, great as that is when once the repugnance to their study has been overcome, as of the help it gives towards obtaining a fair general knowledge of an Order which does not form as a whole the subject of popular monographs, and of which the study is particularly difficult.

In view of the economic importance of Diptera, it is greatly to be regretted that they do not absorb more of the entomological energy that is wasted in investigating trifles that lead to nothing. With Dr. Sharp's account, it is possible at least to make a start.

Economic questions, which would have led the author outside the scope of this work, are seldom referred to. With this necessary exception, it is difficult to find a subject of any importance in entomology that is not, in some place or other, touched on more or less fully, and often in the light of independent observation and research. Very few forms of real interest are omitted; but among them is that of *Dyscritina*, on the life-history of which Mr. E. E. Green has lately thrown light. Though his paper was published since the appearance of Vol. v. of this series, reference might have been made in the short appendix to the present volume to his account of this Forficulid larva, which so singularly modifies our knowledge of the earwigs.

We do not recollect to have before met with the word "exstulpate," which Dr. Sharp is rather fond of using to denote the extruding of an eversible papilla. If it is a latinised form of the German "ausstülpen," it can hardly be considered as an ornament to the English language!

It remains to allude to the illustrations; these are as good as, though relatively fewer than, those in the preceding volume. The figures of *Ornithoptera paradisea*, one of the few butterflies selected for figuring, are not successful. Exquisite as this insect, at least the male, is, it does not look well in a woodcut, and these large blocks look coarse and inappropriate on so small a page.

W. F. H. BLANDFORD.

A COMPREHENSIVE GEOGRAPHY.

The International Geography. By Seventy Authors. Edited by Hugh Robert Mill, D.Sc. Pp. xx + 1098. With 488 illustrations. (London: George Newnes, Ltd., 1899.)

SOME forty years ago geography was the most dreary of subjects in school lessons. Its text-books were as arid as the Sahara, lists of names and compilations of statistics; mere cram, without a single statement or principle which could help the learner to understand the history either of the earth or its inhabitants; useful as exercise for the memory, but baneful in every other respect. All that has been changed. Geography is now taught as illustrative of principles. Like geology, it is an application of a group of the natural sciences to explain a particular problem, the history of the earth; differing however, from that in dwelling more on the superficial aspect—the physiography—of our globe, and less on underlying causes or on the remote past. The volume before us is an example of the new method. Though too large for direct use as a text-book in schools, for it consists in all of over 1100 pages of rather closely-printed type (which ageing eyes will wish thicker), it will filter down to the classes through the teachers. The first part of the work deals with the principles of geography, the more distinctly scientific aspect of the subject, in a series of excellent essays, which treat of the principles and progress of geography, its relation to mathematics, the making of maps, the plan of the earth and the features of its surface, the ocean, atmosphere and climate, the distribution of life, including the races of man, and the political aspect of geography; all these subjects being discussed by very high authorities. Each of the following parts is devoted to one of the great divisions of the earth, treating it first as a whole, and then under its minor natural or political divisions, in a series of separate articles, each of which is contributed by "a specialist or recognised authority of high standing."

To review critically such a book as this demands something like geographical omniscience, to which I have no pretensions; probably the editor himself is about the only really competent person, and he might be not unnaturally suspected of a certain prejudice. So I have

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